

## § 2.1505

monopole antenna at both 121.5 and 243 MHz with the VSWR of less than 1.5.

NOTE: It is desirable that the level of radiated ambient EME at the test site be at least 6 dB below the FCC limits applicable to the EPIRB. It is, of course, not always possible to meet this condition. If the ambient field strength at some frequencies within the specified measurement ranges is too high, it is recommended that one or more of the following corrective steps be employed:

(1) Perform measurements in critical frequency bands during hours when broadcast and other radio stations are off-the-air and ambients from industrial equipment are lower.

(2) Insofar as is possible, orient the axis of an open area test site to discriminate against strong ambient signals.

(3) Vary the bandwidth of the measuring instrument to separate ambient EME from emissions from the EPIRB.

(b) *Temperature*. Except as otherwise noted, the ambient temperature during testing is to be within the range of 4 to 35 °C (40 to 95 °F).

### § 2.1505 Test instrumentation and equipment.

(a) *Receiver (field intensity meter)*. A calibrated field intensity meter (FIM) with a frequency range of 30 to 1000 MHz is required for measuring radiated emission levels. This instrument should be capable of making peak measurements with a bandwidth of 100 kHz.

(b) *Spectrum analyzer*. Spectral measurements are to be made with a spectrum analyzer with a minimum resolution bandwidth no greater than 10 Hz. The video filter, if used, should have a bandwidth wide enough so as to not affect peak readings. A linear video output is desirable for performing measurements of modulation characteristics.

(c) *Storage oscilloscope*. Measurements of modulation characteristics are to be made using a calibrated storage oscilloscope. This instrument is to be DC coupled and capable of manually triggered single sweeps.

(d) *Frequency counter*. A frequency counter with an accuracy of at least 5 parts per million is required for measuring the carrier frequency.

(e) *Signal generator*. A calibrated signal generator with an output of at least 75 mW at 121.5 and 243 MHz is re-

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quired for generating a reference signal for site calibration.

(f) *Antenna*. Radiated emissions are to be measured with calibrated, tuned, half-wave dipole antennas covering the frequency range of 30 to 1000 MHz.

(g) *Temperature chamber*. Tests which call for subjecting the EPIRB to temperature levels other than the ambient temperature are to be performed in a temperature test chamber which can be adjusted to stable temperatures from –20 to +55 °C. This chamber is to be of sufficient size to accommodate the EPIRB under test.

(h) *Vibration table*. A vibration table capable of vibrating the EPIRB with a sinusoidal motion is required. The table must be capable of varying the frequency of vibration either linearly or logarithmically over a range of 4 to 33 Hz with maximum peak amplitudes of up to 2.5 mm.

(i) *Salt fog chamber*. A chamber capable of producing salt fog at a temperature of 35 °C for 48 hours is required. This chamber is to be of sufficient size to accommodate the EPIRB under test.

(j) *Drop test facility*. A facility which will permit dropping an EPIRB from a height of 20 m into water is required. The water must be deep enough so that the EPIRB will not touch bottom when dropped.

### ENVIRONMENTAL AND OPERATIONAL TEST PROCEDURES

#### § 2.1507 Test frequencies.

Testing of an EPIRB for compliance outside a shielded room on a distress frequency is prohibited, since this may interfere with emergency communications. Therefore, all compliance testing outside a shielded room should be conducted on one of the pairs of alternate frequencies specified below:

121.600/243.200 MHz  
121.650/243.300 MHz  
121.700/243.400 MHz  
121.750/243.500 MHz  
121.800/243.600 MHz  
121.850/243.700 MHz  
121.900/243.800 MHz

The above frequencies are to be used for limited testing of EPIRBs for compliance with FCC Rules, subject to the following conditions:

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(a) The testing shall not cause harmful interference to authorized communications on these frequencies.

(b) The testing shall be coordinated with the nearest FCC district office.

For simplicity, 121.5 MHz and 243 MHz will be used throughout this test procedure to indicate the alternate test frequency.

### § 2.1509 Environmental and duration tests.

The environmental and operational tests in § 2.1509 (a) through (e) are to be conducted on a single test unit in the order given below. This sequence of tests also includes the electrical tests in §§ 2.1511, 2.1513 and 2.1515 of this part. The test unit is not to be adjusted, nor is the battery to be replaced during these tests, and a log of battery on-time should be maintained. The above tests are to be performed on the same test unit. The tests in § 2.1509 (f) through (i) may be run in any sequence or may be performed on separate test units.

#### (a) Vibration test.

Step (1) Secure the EPIRB to the vibration table. The EPIRB is not to be operated and should not activate while being vibrated.

Step (2) Subject the EPIRB to sinusoidal motion parallel to one of the three major orthogonal axes under the following conditions:

A. Frequency (Hz)	Peak amplitude (mm)
4-10	2.5
10-15	0.8
15-25	0.4
25-33	0.2

B. The frequency is to be changed either linearly or logarithmically with time between 4 Hz and 33 Hz such that a complete cycle (4 Hz to 33 Hz to 4 Hz) takes approximately 5 minutes.

C. The EPIRB is to be vibrated for at least 30 minutes or six complete cycles.

Step (3) Remount the EPIRB, if necessary, and repeat step 2 for each of the other two major orthogonal axes.

Step (4) Upon completion of the test, perform an exterior mechanical inspection and verify operation by turning the unit on and observing the RF power indicator on the unit or monitoring the transmission with a receiver. Record test results.

(b) *Thermal shock tests.* These tests are to be performed on EPIRBs which are required or intended to float.

#### (1) Low temperature thermal shock test.

Step (1) Place the EPIRB in a temperature chamber for at least 3 hours at  $-20^{\circ}\text{C}$  or colder. The EPIRB is not to be operated while being cooled.

Step (2) Immediately place the EPIRB in water that has been maintained at  $+10^{\circ}\text{C}$  or warmer.

Step (3) After 15 minutes, perform an exterior mechanical inspection and verify operation by turning the unit on and observing the RF power indicator on the unit or monitoring the transmission with a receiver. Record test results.

#### (2) High temperature thermal shock test.

Step (1) Place the EPIRB in a temperature chamber for at least 3 hours at  $+55^{\circ}\text{C}$  or warmer. The EPIRB is not to be operated while being heated.

Step (2) Immediately float the EPIRB in water that is maintained at  $+25^{\circ}\text{C}$  or colder.

Step (3) After 15 minutes, perform an exterior mechanical inspection and verify operation by turning the unit on and observing the RF power indicator on the unit or monitoring the transmission with a receiver. Record test results.

#### (c) Salt fog test.

Step (1) Place the EPIRB in a salt fog chamber for a period of at least 2 hours at a temperature of  $35^{\circ}\text{C}$  ( $\pm 2^{\circ}\text{C}$ ) before exposing it to salt fog. The EPIRB is to be turned off during this test.

Step (2) With the chamber temperature maintained at  $35^{\circ}\text{C}$ , introduce salt fog at the saturation point for 48 hours. The salt fog is to be prepared from a 5% ( $\pm 1\%$ ) salt (sodium chloride solution. For detailed guidance on the preparation of the solution and the apparatus for generating salt fog, refer to MIL-STD-810D (19 July 1983), method 509.2.

Step (3) Upon completion of the salt fog exposure, the EPIRB is to be airdried at room temperature for 12 hours and operation verified by turning the unit on and observing the RF power indicator on the unit or monitoring the transmission with a receiver. Record observations.

(d) *Drop test.* This test is to be performed on EPIRBs which are required or intended to float.

Step (1) Turn the EPIRB on, log the time and drop it three times into water from a height of 20 meters. The water is to be deep enough so that the EPIRB does not touch bottom when dropped. Each drop should be initiated from a different orientation as follows: antenna vertical up; antenna vertical down; antenna horizontal.

Step (2) Upon completion of the drop test, an exterior mechanical inspection is to be